



NUCLEAR ENERGY INSTITUTE

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Executive Vice President

June 22, 2005

Mr. Mark Friedrichs, PI-40
Office of Policy and International Affairs
U.S. Department of Energy
1000 Independence Ave, SW
Washington DC 20585

RE: Notice of Availability and Opportunity for Comment, Voluntary Greenhouse Gas Reporting Revised Interim Final Rule and Draft Technical Guidelines (Section 1605(b), Energy Policy Act, Public Law 102-486)

Dear Mr. Friedrichs:

On behalf of the United States nuclear energy industry, the Nuclear Energy Institute¹ (NEI) appreciates the opportunity to provide comments on the Interim Final Rule, Revised General Guidelines published by the Department of Energy (70 *Fed. Reg.*, 15169, March 24, 2005) and the Draft Technical Guidelines announced in the Notice of Availability (70 *Fed. Reg.*, 15164, March 24, 2005).

These comments portray the important role nuclear energy plays in preventing or reducing the emission of greenhouse gases in the United States, as well as provide specific comment on treatment and calculation of avoided emissions. The Department of Energy (DOE), at the April 26, 2005, public workshop, specifically requested feedback on, and suggestions for improvement to, the methodology laid out in the Draft Technical Guidelines for calculating avoided emissions, which are covered in section 2.4.3 of that document. The nuclear energy industry feels the method presented in the Draft Technical Guidelines underestimates the emissions avoided by all non-emitting technologies, specifically nuclear power projects. NEI believes a more accurate method, using regional CO₂ emission factors, should be adopted. (See Attachment 1 for detailed recommendation.)

¹ NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including regulatory aspects of generic operational and technical issues. NEI members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

The nuclear energy industry is pleased that the Voluntary Greenhouse Gas Reporting program will continue to recognize emissions avoided by non-emitting electric generation as vital tools for reducing greenhouse gas (GHG) emissions and emission intensity in the United States. However, recognition of avoided emissions on a reporting form submitted to (and possibly only seen by) the Energy Information Administration (EIA) is not sufficient. It is important that policymakers and the public understand that projects and actions taken by industry are resulting in GHG emission reductions. Thus, the nuclear energy industry urges EIA to report data in a manner that clearly demonstrates the GHG reductions achieved by the use of non-emitting technologies, such as nuclear energy, hydroelectric generation and renewable energy.

By Avoiding Emissions, Nuclear Energy Reduces or Prevents GHG Emissions

Nuclear energy accounts for 20 percent of the electricity generated in the United States and generates three quarters of all emission-free electricity. The 103 operating nuclear power plants in the United States avoided the emission of nearly 680 million metric tons of CO₂ in 2003. This is more than double the emissions avoided by all other non-emitting generation sources combined (approximately 305 million metric tons of CO₂).²

Nuclear energy is a necessary tool for reducing GHG emissions while supplying large amounts of affordable electricity in the United States and abroad. In Finland, a new nuclear power plant is under construction to meet the growing demand for electricity economically and to aid the country in meeting its Kyoto Protocol GHG reduction target by 2012. France has plans to construct another nuclear power plant. The United Kingdom is now discussing new nuclear plants as part of Britain's future energy policy. Other European countries like Belgium, Sweden and Germany are rethinking their nuclear energy phase-out plans because of the technology's contribution to reducing GHG emissions and meeting Kyoto Protocol targets.

Importantly, developing countries like China and India have aggressive nuclear energy programs and plans for several additional reactors, which will supply energy that would otherwise come from fossil-fired generation and thus will avoid GHG emissions in these growing economies.

Since the Voluntary Greenhouse Gas Reporting program began in 1994, electric companies have been recording the significant GHG emission reductions achieved

² Emissions avoided by nuclear power are calculated using regional fossil fuel emissions rates (from the Environmental Protection Agency's Continuous Emission Monitoring System) and individual plant generation data from EIA. Emissions avoided by other non-emitting sources are calculated using a national fossil fuel emissions rate and EIA generation data.

by increased productivity of the country's nuclear power plants. For 2003, the most recent year posted by EIA, the GHG emission reductions resulting from nuclear energy projects accounted for 37 percent of the reductions reported. (See Table 1.)

Those nuclear energy projects included increased production at existing nuclear plants through improved performance and power uprates. (An uprate is a project that increases the ability of a nuclear plant to transform the heat produced by nuclear fission into electricity.) NEI estimates over 5,000 MW of potential uprate capacity that can be added to existing nuclear plants with capital investment³. All nuclear plant uprates must be approved by the U.S. Nuclear Regulatory Commission (NRC).

Table 1 – Reductions from Nuclear Energy Projects Reported Into the Voluntary Reporting of Greenhouse Gas Program

Report year	Metric Tons of CO ₂ Equivalent Reduced	Percentage of total CO ₂ reductions reported
1994	33,552,547	46%
1995	56,317,262	38%
1996	69,082,581	46%
1997	68,024,990	48%
1998	90,911,254	43%
1999	92,058,395	41%
2000	116,910,333	41%
2001	131,891,108	41%
2002	130,866,556	35%
2003	122,585,103	37%

Source: EIA

Contributing to the President's GHG Intensity Reduction Goal and Beyond

In 2002, President Bush challenged the nation to reduce its GHG intensity by 18 percent by 2012. The nuclear energy industry could reduce GHG emissions in 2012 by 81 million metric tons CO₂ by adding an additional 10,000 MW-equivalent of nuclear energy capacity. These additions, as outlined in a December 23, 2002 letter to then Secretary Spencer Abraham, will be attributable to operational improvements, uprates and the restart of Unit 1 of the Browns Ferry nuclear plant in 2007.

On December 13, 2004, the electric power sector, through a coordinated effort called Power PartnersSM ⁴, committed to reduce the electric industry's GHG emission

³ This estimate is based on "U.S. Commercial Nuclear Power Industry Assessment for Department of Energy Energy Information Agency," October, 2001, and recent uprates approved by the NRC.

⁴ Power PartnersSM is made up of seven organizations: American Public Power Association, Edison Electric Institute, Electric Power Supply Association, Large Public Power Group, National Rural Electric Cooperative Association, Nuclear Energy Institute, and Tennessee Valley Authority.

intensity by 3 percent to 5 percent. A significant amount of this planned GHG reduction is attributable to nuclear energy projects.

Additional GHG reductions from the nuclear energy industry beyond 2012 are expected to come from the construction of new nuclear power plants. Partially aided by DOE's Nuclear Power 2010 program, which aims to have a new nuclear power plant under construction by 2010, the industry is preparing for construction of new plants and has made notable progress over the past several years.

Three applications for Early Site Permits (ESPs) have been submitted to the NRC and are currently under review. Dominion Energy has applied for an ESP at its North Anna site in Virginia. Entergy submitted an application for its Grand Gulf site in Mississippi, and Exelon's application is for the Clinton site in Illinois. This review process has included public hearings at all three sites. The NRC expects to finish review of at least two of the applications in 2006. All three sites are at existing facilities with operating nuclear power plants. It is expected that the next nuclear plants will be built on sites with existing nuclear units.

There are two groups of companies actively working toward applying to the NRC for combined Construction and Operating Licenses (COLs). NuStart Energy is actively investigating two reactor designs and six sites across the country. The reactor designs are the Westinghouse AP-1000 and the General Electric ESBWR. The six sites are Bellefonte Nuclear Plant in Northeast Alabama, owned by the Tennessee Valley Authority; Grand Gulf Nuclear Station, Port Gibson, MS, owned by Entergy Nuclear; River Bend Nuclear Station, St. Francisville, LA, also owned by Entergy; Savannah River Site, a Department of Energy facility near Aiken, SC; Calvert Cliffs Nuclear Power Plant in Lusby, MD, owned by Constellation Energy; and Nine Mile Point Nuclear Station in Scriba, NY, owned by Constellation Energy. A second consortium, led by Dominion Energy, is also looking at the ESBWR reactor design. In addition, TVA is investigating the possibility of building new reactors at its Bellefonte site, which was previously approved for two nuclear units that were never finished. Duke Energy and the Southern Company have both announced that they are actively planning for construction of new baseload generation and that nuclear energy is under consideration to meet their future needs.

The nuclear energy industry is working with the Administration and Congress on policies that will stimulate investment in new nuclear energy facilities in the next few years. With successful completion of four to six plants in the next decade, it is anticipated that much new construction will follow post-2015. Significant new construction of nuclear power plants will be needed in the next 20-30 years to replace existing nuclear plants as their operating licenses expire, to replace retiring fossil units and to meet growing electric demand. Both nuclear plant replacement and expansion is vital to any program aimed at reducing GHG emissions in the future.

Reporting and Registering Avoided Emissions

The Interim Final Rule allows for the reporting and registration of reductions achieved through avoided emissions as laid out in section §300.8 (h)(4). The nuclear energy industry supports the continued inclusion of avoided emissions as recognized emission reductions. We urge EIA to continue to report aggregated reductions in such a way that total avoided emissions from nuclear power projects can be identified.

NEI recommends that EIA continue to report program aggregate data as it has done in the past. This will allow policy makers and the public to understand what projects and actions are actually resulting in GHG reductions and will enable continued comparison with past program reports.

Calculating Avoided Emissions

Section 2.4.3 of the Draft Technical Guidelines describes the calculation of emissions avoided by non-emitting and low-emitting power generation. This calculation multiplies non-emitting generation by 0.59 metric tons of CO₂ per megawatt hour (mt CO₂/MWh). Low-emitting generation is multiplied by the difference between 0.59 mt CO₂/MWh and its “low” emission rate. This factor, 0.59 mt CO₂/MWh, is the U.S. national average emission rate, calculated by dividing total CO₂ emissions from the electric sector by total electric generation.

Because this national average emission rate includes the energy generated at the nation’s non-emitting generation facilities, and because regions of the country have very different generation portfolios for economic and physical reasons, this emission rate will tend to underestimate and undervalue the emissions avoided by non-emitting technologies, including nuclear power projects.

Electric generators are generally dispatched according to their variable cost; the least cost units run first. Because renewable generators like wind and hydro have no fuel cost, they are usually called on first, and they run if they are available. Nuclear energy has low fuel costs and this translates into a lower variable cost than fossil-fired plants. After renewables and nuclear energy, the fossil-fired generators are dispatched. Their variable cost is heavily dependent on their fuel costs. This typical dispatch order means that fossil-fired generators are on the margin and will be the units displaced by non-emitting technologies. Using an emission factor that includes the non-emitting technologies, as the national average emission rate does, will cause the emissions avoided by all non-emitting projects to be underestimated.⁵

⁵ For a more complete discussion of calculating avoided emissions from non-emitting technologies, see the Discussion Paper “Analytical Approaches to Calculating Avoided Emissions,” June 27, 2003 submitted by NEI to DOE.

A large majority of the nuclear power plants in the United States are in the eastern half of the country, where most regions have average emission rates and marginal emission rates that are higher than the national average. All of the nuclear power uprate projects completed by 2012 will be at existing nuclear power plants. It is very likely that most of the new reactor construction in the next 15-20 years will be at existing nuclear energy facilities. Therefore, if a national average emission rate is used to calculate avoided emissions resulting from nuclear power projects, the estimates will be lower than the actual reductions realized.

Ideally, avoided emissions would be calculated by using the actual emission rates of the units displaced. In some cases, a reporting entity may know exactly what units are displaced. If a reporting entity can demonstrate such knowledge satisfactorily to EIA in its report, it should be allowed to calculate avoided emissions using the known displaced generator rates. This would be the most accurate method for calculating avoided emissions, and NEI strongly recommends that EIA accept this method where available.

In most cases, however, such specific knowledge is not available. In these cases, the most accurate estimate of CO₂ emissions avoided by non-emitting technologies would be calculated using a regional marginal emission factor. (See Attachment 1) However, the definition of avoided emissions in the Interim Final Guidelines includes emissions avoided by low-emitting technologies as well as non-emitting technologies. It is hard to determine exactly what types of fossil generation will be displaced by a low-emitting plant. To qualify as a low-emitting plant, a plant must presumably have an emission rate lower than the factor used to calculate avoided emissions.

Even in the case of low-emitting technologies, it is most accurate to employ a regional emission factor for avoided emissions calculations. Take for example a new generator that has an emission rate of 0.65 mt CO₂/MWh that comes online in a region with an average emission rate of 0.85 mt CO₂/MWh. The plant's emission rate is higher than the national average (0.59 mt CO₂/MWh), but it will be generating electricity and displacing other higher-emitting generators in its region. A low-emitting generator in Ohio will not displace generators in Maine or Texas. Therefore, it is, in fact, reducing the total CO₂ emitted both in its region and in the country. Furthermore, since it will be displacing emissions in its region, it will also be lowering the national average emission rate, which is calculated by dividing total U.S. emissions by total generation.

For accuracy, NEI recommends splitting avoided emissions into two parts, one for non-emitting technologies and the second for low-emitting technologies. For non-emitting technologies, a regional, marginal emission rate should be used as the factor for calculating avoided emissions. (See Attachment 1) For low-emitting technologies, perhaps a regional average emission rate is more appropriate.

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Regardless, accuracy is enhanced for both types of avoided emissions if regional factors are employed instead of a national average.

Conclusion

Nuclear energy is already an important part of existing emission reduction programs because it supplies a large quantity of baseload electricity without emissions. This unique characteristic of nuclear energy will be an important reason to build new nuclear power plants in the future. Full recognition of the emissions prevented by nuclear energy must be acknowledged so the public and policymakers understand the role nuclear energy plays in balanced environmental and energy policy.

NEI supports continued inclusion of avoided emissions in the Voluntary Greenhouse Gas Reporting program. To best meet the President's goal of improved accuracy, NEI recommends revising the calculation factors for avoided emissions, specifically those from non-emitting technologies.

Further, the nuclear energy industry hopes that EIA will continue to report aggregated project-level data, so that policymakers and the public can understand how GHG reductions are being achieved in the United States.

If you have questions regarding our comments and recommendations, please contact me at 202.739.8031, or Mary Quillian, NEI's Senior Manager for Environmental Policy and Planning, at 202.739.8013.

Sincerely,

A handwritten signature in black ink that reads "Angelina S. Howard". The signature is written in a cursive, flowing style.

Angelina S. Howard

Attachment 1 – Discussion of Avoided Emissions Calculations

Attachment 1

Discussion of Avoided Emissions Calculations

Table 2 below compares four different sets of regional emission rates. The first set contains the regional average emission rates supplied by DOE on page 139 of the Technical Draft Guidelines for use in calculating indirect emissions. These rates are from the Environmental Protection Agency (EPA).

The second set shows regional average fossil generation emission rates. They were calculated with AEO 2005 data for 2003 (Tables 60-72 Electric Power Projections for EMM by region) by taking the total emissions divided by the total generation from fossil generation sources.

The third and fourth sets, in the last two columns, were both derived from 2004 data in the Energy Velocity database by Global Energy Decisions, Ltd., which compiles data from EPA's continuous emission monitoring system (CEMS) database. The third set investigates emission rates for cycling and peaking units, which NEI defined as any unit that ran less than 6,000 hours. The fourth set tries to replicate more closely the units on the margin that would be displaced most by additional non-emitting technology. Here, NEI looked at the plants in each region that ran between 40 percent and 70 percent of the year.

Not every plant has a CEMS unit, and there are a few fossil plants listed in the EPA database as having a "0 pounds per MWh" emission rate. For coal and natural gas generation, this is clearly inaccurate. Those units were excluded from calculations in the last two columns.

Table 2 – Comparison of Regional Emission Rates

Region	Average CO ₂ Emission Rate (metric tons CO ₂ /MWh)	Average Fossil CO ₂ Emission Rate (metric tons CO ₂ /MWh)	Average Emission Rate of Units Running Less Than 6000 Hours per Year (metric tons CO ₂ /MWh)	Average Rate for Units Running 40%-70% of the Year (metric tons CO ₂ /MWh)
ECAR	0.98	1.01	0.90	0.98
ERCOT	0.71	0.70	0.55	0.51
FRCC	0.73	0.73	0.70	0.66
MAAC	0.57	0.90	0.65	0.83
MAIN	0.71	1.10	0.66	1.21
MAPP	0.95	1.02	0.81	1.08
NPCC	0.49	0.79	0.68	0.71
SERC	0.87	0.86	0.61	0.71
SPP	0.95	0.80	0.69	0.74
WECC	0.50	0.81	0.54	0.52

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It is clear from these four different sets of CO₂ emission factors that using the national average rate of 0.59 mt CO₂/MWh will clearly underestimate the contribution of non-emitting technology in most regions of the country.

More accurate estimates of CO₂ emissions avoided will encourage more projects in areas where emission intensity is high. Non-emitting projects in these regions achieve a larger reduction to both total CO₂ reductions and emission intensity.

Therefore, NEI strongly recommends the use of regional emission factors for calculating avoided emissions, particularly for non-emitting technologies. It is also most accurate to use marginal emission rates with non-emitting technologies, like those in the last column of Table 2.